

RAPID TANNING OF SOLE LEATHER USING BAG TANNING TECHNIQUE

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ABSTRACT

Sole leathers are manufactured by two conventional methods: (i) pit tanning process (ii) Bag tanning process generally followed by small tanner or village tanner. The Commercial bag tanned leathers are not so properly tanned so as to give the chemical and physical properties of good sole leather, though the method of bag tanning is quick and simple. In the present study, bag tanning technique has been modified and two processes have been worked out to manufacture standard sole leathers so as to overcome the drawback of the conventional bag tanned leather.

In India sole leathers are manufactured by two conventional methods: (i) pit tanning process (time taken from raw to finish generally varies from tannery to tannery and may cover a period of 4-12 weeks); (ii) Bag tanning process generally followed by the small or village tanner (from raw to finish about 3 weeks). The process for the manufacture of sole leather may differ depending on a number of factors such as the type of tanning material used, difference in tanning period, quality of raw materials, tanning temperature, different pretreatments, the type of leather required, and the like. Rapid tanning may mean less labour, space, quick turn over etc. Several such rapid tanning techniques have been suggested from time to time but there is still room for newer or modified methods to suit specific conditions. In India, the traditional tanning is lengthy and though bag tanning is a rapid technique the leather suffers being spongy.

It has generally been recognised that unless the grain is fixed by some pretanning agent, rapid tanning may result in pebbling of grain. Shuttle-

worth¹ recommended pickling of stock with sulphuric acid and salts to condition the grain. Different other pretanings e.g. isyntan², polymeric hexametaphosphate³, formaldehyde⁴, chrome⁵ were recommended by different investigators. A buffer pretreatment at a pH range of 7 to 8 was recently suggested for rapid tanning⁶.

Bag tanning is an elegant rapid tanning technique requiring little or no control and equipment but bag tanned leathers fall short of the chemical and physical requirements for good sole leather. Certain improvements on the bag tanning process have however been suggested^{7,8,9}, but no attempts for making standard sole leather using bag tanning process have been reported. In the present work two processes are described for the manufacture of standard sole leather so as to overcome the drawbacks of conventional bag tanned leathers.

Experimental

Process I: Wet salted buffalo hides (weight range 40-50 lbs) were taken and soaked overnight in a pit containing 500% water (on raw weight). Lime at the rate of one pound per thousand pounds of soak water was added to the pit to avoid bacterial damage. The soaked hides were cut into sides and lined in a pit containing a liquor of the following composition: Sodium sulphide 3.5%, caustic soda 2% and water 300% (on soaked weight). The sides were handled thrice and left overnight in the liquor. Next day they were unhaired, scoured and fleshed and weighed. They were washed and cleaned completely by keeping them overnight in a pit containing 300% water, 1% ammonium sulphate and 1% sulphuric acid (on pelt weight). Next morning, they were washed well in water and put in the

"Malni" liquor. An used liquor of 10°Bk was taken as the malni liquor (pH 4.4-4.5). The functions of the "Malni" liquor is to pretan the hides and condition the grain so that the pelts become suitable for stitching into bags. The delimed pelts were handled in the malni liquor for two days and were then stitched into bags and hung up over pits. The bags were then filled with 25°Bk liquor made up of wattle extract. The bags were kept filled with liquor throughout the day and kept in the liquor in the pits overnight. Next morning, the bags were hung up again and filled with liquor as before and at night left in the liquor. On the third day the bags were reversed and the tanning continued in the same way for two days. Following day the bags were cut out, trimmed free of stitched portions and left in the liquor overnight. (It may be pointed out that complete penetration is generally achieved within three days in case of comparatively thinner hides but may take two or three days more for thicker hides). Next day the leathers were drum tanned with 15% spray dried wattle extract after beaming them. The extract was fed in three feeds in dry form into the drum. The drum was run for about five hours. On the succeeding day another 15% extract was fed in and the goods were drummed as before. The tanned pelts were taken out and piled overnight. Next morning, the leathers were drummed with 1% formic acid solution. Total float taken was 100% on pelt weight.

Bleaching, Myrabing, Loading and oiling:

The sides were bleached with 1% of sodium bisulphite in a drum containing 25% water. This was followed after 15 minutes with 1% of oxalic acid and the drum was run for 15 minutes more. The sides were washed and drummed for 2 hours with 40% of 30°Bk Myrob liquor. The sides were beamed and loaded in the drum with 2% glucose, 2% epsom salt and 1% oxalic acid. These materials were fed into the drum in solid form after crushing. The drum was run for 30 minutes, 2% T.R.O. and 3/4%

groundnut oil mixed together were put inside the drum and drumming was continued for 30 minutes more. The sides were taken out and hooked to sammimg.

Setting: The sammed sides were set twice by machine and dried completely.

Seasoning and rolling: The sides were seasoned with the following solutions, dried and rolled.

Season composition

Casein	225 gm.
Borax	57 gm.
Linseed seeds	15 gm.
Bar soap	15 gm.
Boric acid	15 gm.
Water to	4.5 litres

Process 2

Slight modification of the process was made in another experiment when the use of drum was completely eliminated. The procedure upto bag tanning was the same as for the previous process. The trimmed leathers were spread flesh side up and 15% spray dried extract was sprinkled on the flesh side and the sides were piled flesh to flesh. Next morning, again 15% extract was sprinkled in the same way. On the 3rd day the sides were brushed with 1% formic acid solution on both the sides and piled for 30 minutes. After thorough wash, the leathers were bleached on the table with 1% sodium-bi-sulphite which was applied by a brush as 10% solution. This was followed after 10 minutes with a brush application of 1% oxalic acid (10% solution). The sides were washed and put overnight in a pit containing 30° Bk myrab liquor. The next morning, the sides were beamed and loading materials (same as in process I) were applied through the flesh side in a concentrated solution form. After 2 hours, oil mixture (same as in process I) was applied on both sides and the sides were hooked to sammimg. The sammed sides were set, dried, seasoned and rolled as in previous process.

Results : The chemical and physical properties of the leathers produced are given in table I and II.

Discussion : While considering the physical and chemical properties of the sole leather it may be mentioned that the results obtained are the average of the analysis of two sides of the same lot. It may be seen from table I that chemical properties of sole leather produced are quite comparable to that of sole leather analysis reported earlier¹¹. The water soluble in these leathers is 13.6 to 14.6%. These results are quite acceptable as in recent reported analysis of rapid tanned sole leathers, the water soluble data is much higher.^{12,13} The results in table II show that physical properties of the leather are not affected by rapid tanning. Yield of 53.58% is fairly all right. The leathers have a low value for abrasion inspite of higher degree of tannage.

Conclusion

These processes are quite simple and can be adopted by tanners who

do bag tanning. The tanners who can afford to use a drum can follow process I and the other can follow process II. The properties of these leathers are comparable to those of any standard sole leather. Usually the bag tanner uses bark for tanning and these processes may appear costly. But in these processes bag tanning technique is employed to make standard sole leather and hence it should not be confused with usual bag tanning technique. The time taken is 14-16 days for process 1 and 17-19 days for process 2.

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TABLE I
Chemical analysis of sole leather (Analysis as received)

Process No.		Moisture %	Fat %	Water soluble %	Insoluble Ash %
1	..	11.9	2.9	13.61	Negligible
2	..	12.3	2.6	14.61	Negligible
Process No.	Hide substance %	Fixed tan %	Degree of tannage	pH of water soluble	
1	41.16	30.43	73.93	3.4	
2	41.72	28.78	68.98	3.6	

TABLE II
Physical properties of sole leather

Process No.	Colour	From raw to finish (No. of days)	Flexibility	Tensile strength lb./sq. "		
1	Light pink	14-16	Flexible	4519 4194		
2	Light pink	17-19	Flexible	5997 4382		
Process No.	Percentage yield on pelt weight	Abrasion after 500 revolutions (In inches)	Apparent density (g/cc.)	Water Absorption %		
				½ hour	2 hours	24 hrs.
1	53.58	.06	0.919	30.8	35.4	37.2
2	53.58	.059	0.984	34.4	39.7	40.5

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